PROGRAM AND ABSTRACTS

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Total chilling times were 28 or 56 days; the warm breaks added 1 to 3 days to total treatment time. Standard laboratory germination tests were run, and Czabator's Peak Value (PV) was used to measure germination rate. Mean time to germination (MGT) was also calculated.

All lots germinated above 90%, and all stratification treatments gave higher PV's than the control. Interrupting 28-day treatments with a 1-day warm break at day 21 produced a significantly faster rate than that of uninterrupted 28 days (6.9 vs 5.9). Breaks at 7 or 7 and 14 days were less effective than the standard 28 days. Any interruption of 56-day stratification improved PV, but the best overall treatment was a single break at day 28 (6.8). MGT data show the same general trends.

Our results suggest that a 1-day warm interruption at day 21 of a 28-day stratification could provide faster germination than either 28 or 56 days of cold stratification without a break. This step could provide nursery managers with a simple, quick way to increase germination rate without using extended stratification periods. The reasons for this effect are unknown, and additional research is justified.

OSMOTIC PRIMING INCREASES SPEED OF GERMINATION AND SEEDLING GROWTH OF *Pinus eldarica*

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In order to study the effect of polyethylene glycol (PEG) concentrations and seed treatment durations, the seeds of eldarica pine (*Pinus eldarica*) were placed in aerated solution of PEG 8000 for 0, 2, 5, 7, 9 and 11 days, using three concentrations of PEG i.e. 200, 300 and 400 g kg^{-1} water. After treatment, the seeds were germinated in an incubator and greenhouse. In the incubator, the seeds were placed in petri dishes on filter paper while in the greenhouse the seeds were sown in plastic trays filled with peat moss and covered with a thin layer of vermiculite. Days to emergence, % germination and seedling dry weight were studied. Seed treatment did not improve % germination, but enhanced speed of emergence and increased seedling dry weight up to 9 days seed treatment duration. Thereafter no increase was observed in dry weight. PEG concentration of 300 g kg^{-1} water produced maximum dry weight, followed by concentration of 200 g kg^{-1} water.

A METHOD FOR INCREASING THE GERMINATION OF OCALA SAND PINE (*Pinus clausa* var. *clausa* D. B. WARD) SEED IN STRESSFUL ENVIRONMENTS

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Regeneration of Ocala sand pine stands by direct seeding often fails because of high seed predation. Due to environmental concerns, land managers prefer to avoid the use of chemicals to control seed predation. Past research has shown that even though Ocala sand pine seed is non-dormant, pre-sowing seed treatments will increase the rate of germination under favorable laboratory conditions. If these treatments also increase the germination rate under the dry stressful conditions which commonly exist in the natural environment, then this could reduce the exposure time of seed to predation, and thereby hopefully increase stand establishment. In the laboratory phase of this study the effect of soaking seed with and without aeration followed by moist prechilling for 28 days was evaluated for its effect on seed germination in sand at moisture levels of 3, 5, and 7 percent by weight. The effects of a pre-sowing aerated seed soak, moisture retaining gels, and planting depth on germination were compared in the field portion of the study.

Pre-sowing seed soaks significantly increased both speed and completeness of laboratory germination. Seed given the aerated and non-aerated treatment reached a 50 percent germination level after 10 and 16 days, respectively, while the control seed were still below this level after 28 days. The aerated soak treatment had the best total germination at 72 percent, followed by the non-aerated treatment with 55 percent, and the control with only 15 percent. Although the control seed performed poorest at all moisture levels, the greatest difference occurred at the 3 percent level where treated seed averaged 35 percent germination and the controls only 4 percent.

After 5 weeks in the field, 16 percent of the presoaked seed had germinated compared to 2 percent of the controls. Treatment differences were much greater for those seed planted 1.25 cm deep, where germination was 29 and 5 percent of the soaked and control seed, respectively. Covering the seed patch with a moisture-holding gel had no affect on seed planted 0.6 cm deep, but increased germination from 5 percent without to 23 percent when gel was spread over seed planted 1.25 cm. deep.

Although Ocala sand pine seed is non-dormant, it takes about 4 or 5 rainfalls before germination begins. Because of this, most of the seed is exposed to at least 5 weeks of seed predation. And, due to common dry periods, many seeds are exposed for up to 10 weeks. The pre-sowing aerated seed soak increased the germination rate of Ocala sand pine seed even in sand at a very low moisture level. Since most normal seed will not even germinate under these stressful environmental conditions, this treatment should reduce the loss of seed to predation by shortening exposure time. The field portion of the study, where predation was allowed to occur at normal rates, supports this assumption. It also shows regeneration success should be improved considerably if seed are given the aerated presoak treatment and sown at the proper depth.

ESTIMATION OF VIABILITY CONSTANTS FOR SEED STORAGE: A TEST OF THE ELLIS - ROBERTS EQUATION ON FOUR SOUTHERN TREE SPECIES

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Based on extensive research with seeds of numerous crop species, E. H. Roberts and R. H. Ellis of the University of Reading (UK) have proposed that the effects of temperature and seed moisture content, the most important factors in seed longevity in storage, can be described mathematically. They propose a general model,

$$v = K_i - \frac{p}{10^{K_E - C_W \log_{10} m - C_H t - C_Q t^2}}$$

In which v = probit of percent viability after p days' storage at m % seed moisture and t°C. K_i is probit of initial seed lot viability, and K_E, C_W, C_H, and C_Q are species constants. Once the constants have been determined for a species, viability retention can theoretically be predicted for any period of storage in a wide range of environments. This study is a test of the procedure on four southern tree species.

Single lots of loblolly pine (*Pinus taeda* L.), slash pine (*P. elliottii* Engelm.), sweetgum, (*Liquidambar styraciflua* L.), and sycamore (*Platanus occidentalis* L.) were placed in storage at the Forestry Sciences Laboratory, Starkville, Mississippi at moisture contents of 3 to 18 percent and temperatures of - 18° to 45°C. Samples drawn periodically from these lots have been germinated by A.O.S.A. test standards to determine viability retention over time, and equations have been fitted for each species by multiple regression analyses. This paper reports results after 8 years for loblolly and sweetgum, 7 years for slash, and 6 years for sycamore.